

# Claims

- [c1] 1. An improved communications system of the type in which a public switched telephone network has communications devices of both circuit switched and packet transfer types at a plurality of customer premises that intercommunicate via at least one telco central office with communications devices of like respective types, the improvement comprising:
- an access network including an access concentrator located at a first said customer premises and a transfer switch located at a first said telco central office;
  - wherein said access concentrator:
    - accepts both switched signals from said circuit switched types of said communications devices and packet signals from said packet transfer types of said communications devices; and
    - communicates both of said switched signals and said packet signals as a terminating node signal to said transfer switch; and
  - wherein said transfer switch:
    - accepts said terminating node signal from said access concentrator;

separates said switched signals from said terminating node signal for transmission onward to instances of said circuit switched types of said communications devices at another said customer premises than said first said customer premises;  
and

separates said packet signals from said terminating node signal for routing onward to instances of said packet transfer types of said communications devices at another said customer premises than said first said customer premises.

[c2] 2. The improved communications system of claim 1, further comprising at least one relay node located between said access concentrator and said transfer switch, to communicate said terminating node signal over longer distances between the customer premises and the telco central office.

[c3] 3. The improved communications system of claim 1, wherein:

said terminating node signal includes a circuit layer for said switched signals and at least one packet layer for said packet signal, wherein:

said circuit layer is configured as dedicated to a set

number of sub-circuits when said access network is initially provisioned and thereby able to accommodate a like said number of said switched signals; and  
said packet layers dynamically shared and thereby able to include a quantity of said packet signals ranging from as few as none to as many as a plurality.

- [c4] 4. The improved communications system of claim 1, wherein said access concentrator employs a protocol which is a member of the set consisting of POTS, T1, E1, DSx, xDSL, SLC-96, GR-303, and SONET/SDH.
- [c5] 5. The improved communications system of claim 1, wherein said access concentrator communicates said terminating node signal to said transfer switch step using a wireless link.
- [c6] 6. The improved communications system of claim 1, wherein:  
the telco central office includes a central office switch connecting to said instances of said circuit switched types of said communications devices at said another said customer premises than said first said customer premises;

the telco central office includes a router connected to a digital network connecting to said instances of said packet transfer types of said communications devices at said another said customer premises than said first said customer premises; and said transfer switch includes:

a first external interface connected to the central office switch, wherein said first external interface employs a protocol which is a member of the set consisting of T1, E1, and DSx to direct said switched signals into the central office switch; and a second external interface connected to the digital network, wherein said second external interface employs a digital network protocol.

[c7] 7. The improved communications system of claim 6, wherein said digital network protocol is a member of the set consisting of Ethernet, wireless LAN, universal serial bus (USB), firewire, infiniband, fiber-channel, bluetooth, and RFid.

[c8] 8. The improved communications system of claim 1, wherein said access concentrator employs network address translation (NAT) along with private (non-routable, internal) internet protocol (IP) addresses.

[c9] 9. The improved communications system of claim 1, wherein said transfer switch employs network address translation (NAT) along with private (non-routable, internal) internet protocol (IP) addresses.

[c10] 10. The improved communications system of claim 1, wherein:

said packet transfer types of said communications devices employ ethernet signal protocols;

said access concentrator includes at least one ethernet interface, to send and receive said packet signals to and from said packet transfer types of said communications devices; and

said access concentrator is suitable for monitoring traffic on said access network, filtering it based on ethernet MAC addresses, transferring appropriate said traffic onward to said transfer switch in said terminating node signal.

[c11] 11. The improved communications system of claim 10, further comprising at least one remote concentrator located between said access concentrator and said transfer switch, to communicate said terminating node signal over longer distances between the customer premises and the telco central office.

[c12] 12. A method for bandwidth transfer on a public

telecommunications network wherein communications devices using switched signals and packet signals are located at a plurality of customer premises and intercommunicate via at least one telco central office, the method comprising the steps of:

- (1) accepting at least one customer signal from the communications devices into an access concentrator, wherein each said customer signal is a member of the set consisting of the switched signals and the packet signals;
- (2) integrating all said customer signals received at said access concentrator into a terminating node signal;
- (3) communicating said terminating node signal to a transfer switch;
- (4) accepting at least one said terminating node signal at said transfer switch;
- (5) separating all said switched signals from said terminating node signal and transmitting said switched signals onward to instances of said circuit switched types of said communications devices at another said customer premises than said first said customer premises; and
- (6) separating all said packet signals from said terminating node and routing said packet signals onward to instances of said packet transfer types of said

communications devices at another said customer premises than said first said customer premises.

[c13] 13. The method of claim 12, further comprising passing said terminating node signal via at least one relay node located between said access concentrator and said transfer switch, to communicate said terminating node signal over longer distances between the customer premises and the telco central office.

[c14] 14. The method of claim 12, wherein:  
said terminating node signal includes a circuit layer for said switched signals and at least one packet layer for said packet signal, wherein:  
said circuit layer is configured as dedicated to a set number of sub-circuits when said access network is initially provisioned and thereby able to accommodate a like said number of said switched signals;  
and  
said packet layers dynamically shared and thereby able to include a quantity of said packet signals ranging from as few as none to as many as a plurality.

[c15] 15. The method of claim 12, wherein said step (3) includes employing a protocol which is a member of the

set consisting of POTS, T1, E1, DSx, xDSL, SLC-96, GR-303, and SONET/SDH.

[c16] 16. The method of claim 12, wherein said step (3) includes wireless communication of said terminating node signal to said transfer switch.

[c17] 17. The method of claim 12, wherein:  
the telco central office includes a central office switch connected to said instances of said circuit switched types of said communications devices at said another said customer premises than said first said customer premises;  
the telco central office includes a router connected to said instances of said packet transfer types of said communications devices at said another said customer premises than said first said customer premises;  
said step (5) includes transmitting said switched signals via said central office switch; and  
said step (6) includes routing said packet signals via said router.

[c18] 18. The method of claim 17, wherein said step (6) further includes employing a digital network protocol which is a member of the set consisting of ethernet, wireless LAN, universal serial bus (USB), firewire, infiniband,



fiber-channel, bluetooth, and RFid when routing said packet signals via said router.

[c19] 19. The method of claim 12, wherein said step (1) includes network address translation (NAT) in said access concentrator.

[c20] 20. The method of claim 12, wherein said step (3) includes network address translation (NAT) in said transfer switch.

[c21] 21. The method of claim 12, wherein:  
said customer signal is an instance of the packet signals; and  
said step (1) includes receiving said customer signal into an ethernet interface; and  
said step (2) includes filtering said customer signal for selective inclusion in said terminating node signal based on ethernet MAC addresses.

[c22] 22. The method of claim 21, wherein said step (3) includes:  
accepting at least one said terminating node signal into a remote concentrator;  
integrating all said terminating node signals received at said remote concentrator into a distributor node signal; and

communicating said distributor node signal to a transfer switch in place of the original said terminating node signals.

[c23] 23. The method of claim 22, wherein said step (3) includes wireless communication of said distributor node signal to said transfer switch.

[c24] 24. An improved transfer switch for use via at least one telco central office in a communications system of the type in which a public switched telephone network has communications devices of both circuit switched and packet transfer types at a plurality of customer premises that intercommunicate, the improvement comprising:  
said transfer switch accepting a terminating node signal from an access concentrator at a first said customer premises, wherein said access concentrator has formed said terminating node signal from both switched signals from said circuit switched types of said communications devices and packet signals from said packet transfer types of said communications devices;  
said transfer switch separating said switched signals from said terminating node signal for transmission onward to instances of said circuit switched types of said communications devices at a second said customer premises; and

said transfer switch separating said packet signals from said terminating node signal for routing onward to instances of said packet transfer types of said communications devices at said second customer premises.

[c25] 25. An improved access concentrator for use in a communications system of the type in which a public switched telephone network has communications devices of both circuit switched and packet transfer types at a plurality of customer premises that intercommunicate, the improvement comprising:

said access concentrator accepts both switched signals from said circuit switched types of said communications devices and packet signals from said packet transfer types of said communications devices; and said access concentrator communicates both of said switched signals and said packet signals as a terminating node signal over a first internal interface to a transfer switch located at a said telco central office.